Assembly Considerations for Large Reflectors

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This paper discusses the technologies developed at LaRC in the area of erectable structures. The information is of direct value to LDR because an option for the LDR backup structure is to assemble it in space. The efforts in this area, which include development of joints, underwater assembly simulation tests, flight assembly/disassembly tests, and fabrication of 5-meter trusses, led to the use of the LaRC concept as the baseline configuration for the Space Station Structure.

The Space Station joint is linear in the load and displacement range of interest to Space Station; the ability to manually assemble and disassemble a 45-foot truss structure was demonstrated by astronauts in space as part of the ACCESS Shuttle Flight Experiment. The structure was built in 26 minutes 46 seconds, and involved a total of 500 manipulations of untethered hardware. Also, the correlation of the space experience with the neutral buoyancy simulation was very good. As shown in FIGURE 1, sections of the proposed 5-meter bay Space Station truss have been built on the ground.

Activities at LaRC have included the development of mobile remote manipulator systems (which can traverse the Space Station 5-meter structure), preliminary LDR sun shield concepts, LDR construction scenarios, and activities in robotic assembly of truss-type structures. Some preliminary studies on the effective strut stiffness, as affected by metal joints and the CTE of composite struts, have also been examined.

In summary, the technology of erectable structures in space for the LDR backup structure has been successfully developed. The other activities are directly of value to LDR and should be continued.

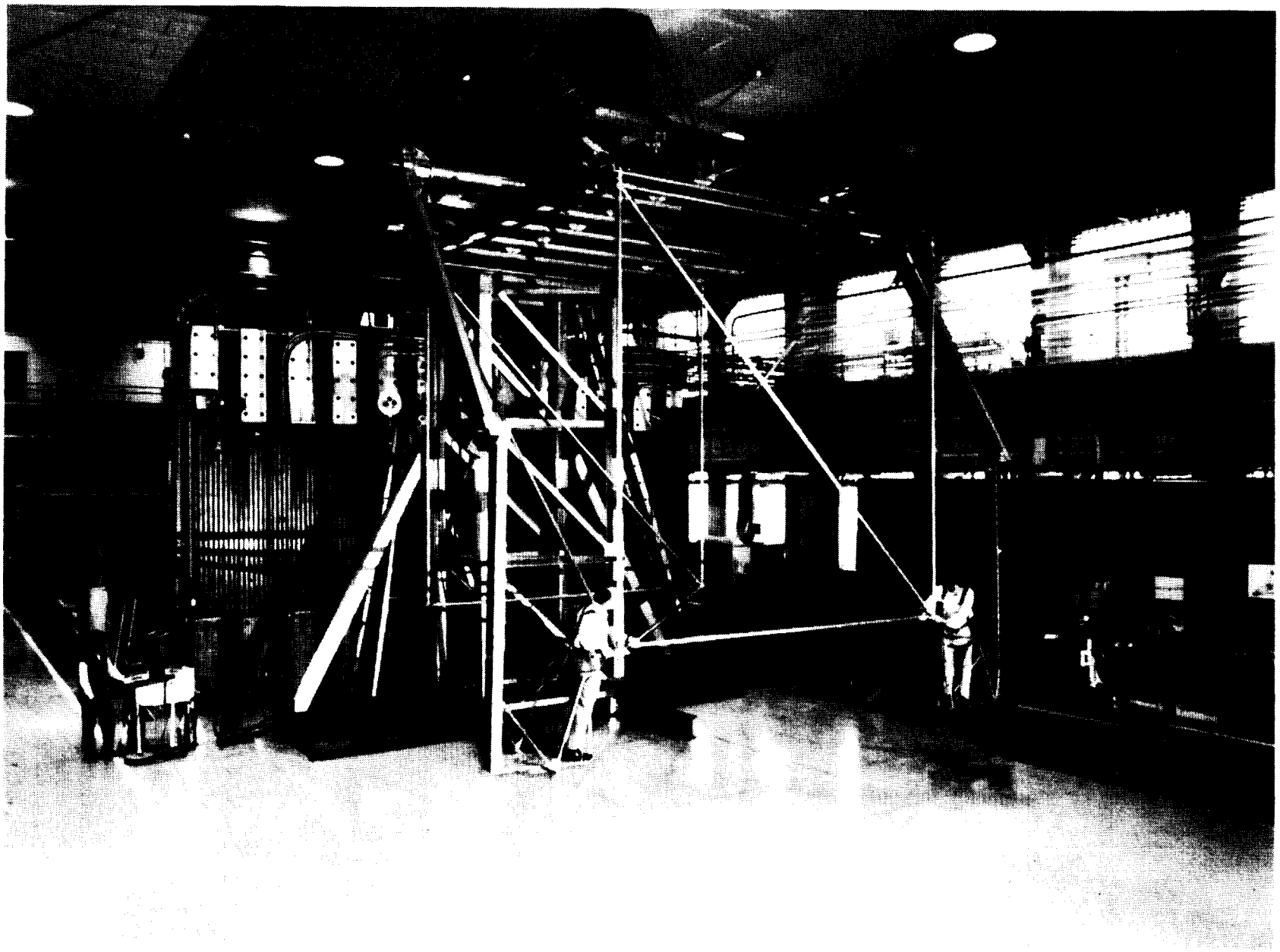

FIGURE 1. Space Station Structural Model